

Compliance Assessment Report CAR_NRW0044535

Permit being assessed: JP3632ZH.

For: Barry CHP , **held by:** Dow Silicones UK Limited

At: Wimborne Road - Dock 2, Barry, Vale of Glamorgan, CF63 3DH.

Type of assessment: Audit,

Reason: Routine.

On: 21/05/2024 between 09:00 and 16:00.

Parts of permit assessed: Energy, Raw Materials, Waste .

NRW Lead Officer: Geraint Harris.

Report sent to: Jude Sartor, Environmental Specialist , on 12/06/2024.

1. Summary of our findings (full details in section 4)

Part of permitted activity assessed (compliance criteria)	Assessment result	Permit condition
IR1C - Installations - Management - Energy Efficiency	Assessed (A)	
IR1D - Installations - Management - Efficient use of raw materials	Assessed (A)	
IR1D - Installations - Management - Efficient use of raw materials	Assessed (A)	
IR4B - Installations - Information - Reporting	Assessed (A)	
IR1A - Installations - Management - General Management	C3 Minor	Permit Condition 1.1.1(b)

Result types are explained in more detail in the 'Important Information' section below.

Total non-compliances recorded	Total non-compliance score
1	4

How we use the non-compliance score to calculate your annual fee is explained in the 'Important Information' section below.

2. What action is required?

Criteria	Action needed	Complete by
IR1A	Update systems and procedures to include all of the monitoring requirements stated within Schedule 3 of the	Already completed

Criteria	Action needed	Complete by
	permit.	

Compliance criteria codes are listed in the 'Important information' section below.

3. What will happen next?

Any non-compliance we have identified and recorded on this form is an offence. It can result in criminal prosecution and/or suspension or revocation of your permit.

At this time, we do not intend to take any further action.

This statement does not stop us from taking additional enforcement action if further relevant information comes to light or offences continue.

4. Details of our assessment

Dow CHP

EPR JP3632ZH

Forced Draft Mode Operations

Dow's CHP is capable of operating in several modes of operations as stated within the introductory note of their Environmental permit. One such mode of operation is forced draft or auxiliary mode which involves the HRSG's operating independently as boilers. Operators who are permitted to operate in FD mode as a normal part of their operations will have FD specified emission limit values (ELV's) stated within Schedule 3 of their permit. Those who don't, like Dow, that need to run in FD mode intermittently to maintain steam supply to sustain operations during GT operational upsets, can still operate in FD mode for short periods. This is on the proviso that a credible recovery plan to bring the gas turbines back online is presented and agreed with the Competent Authority. Over the past two years Dow have strived to bring their GT's back online and limit their FD operation. Upon receiving the monitoring returns for Q1, Dow was asked what their recovery plan and estimated timelines were for the two GT's. Dow responded stating that the GT's were back in operation and that with all 3 HP boilers being operational they have the flexibility to shut one down if the GT is not operational and so limit FD mode operations. With regards to the GT feeding emission point A3, Dow stated that "after installation of a new ignitor part by Ethos, GT-B started up on 18th of April and has run since. Operation has been a combination of TEG only and TEG fired. We had an issue with a damper limit switch and the unit ran in TEG up the bypass stack whilst we fixed the damper limit switch. The unit was then put back in TEG fired mode. This unit has very low NOx emissions with the GT operational". Previously Dow have shared their recovery plans verbally during compliance meetings, However, it was decided that going forward Dow would put together a detailed recovery plan for standard upset scenarios. This is intended to be a live document which will be edited as new scenarios are experienced. A draft of this document was shown to NRW on the 21st of May during a site visit.

Since the guidance offers no further advice with regards to recovery plans it has been agreed that any GT downtime/FD mode operations over 24 hours in duration, that exceed the current permit limits in schedule 3, must be reported to NRW during the normal working week along with a credible recovery plan. Any reasons for GT downtime/FD mode operations under 24 hours must be recorded within Dows EMS for future audit.

Q1 2024 Monitoring Returns

The emissions for Q1 for emission points A1 and A3 have been split up into forced draft (FD) mode and turbine exhaust mode (TEG).

Emission Point A1

The emissions from A1 while operating in TEG mode are well within compliance. The emissions from A1 while operating in FD mode (109 hours or 7% of the reporting period) are within the original boiler ELV's. It is important to remember that while operating in FD mode, the actual stack flowrate and hence mass emission is significantly less (around half) – so the mass impact, for NOx, when running in FD mode is similar or less.

Emission Point A2

The emissions from emission point A2, the fired boiler, are significantly below the permitted ELV's.

Emission Point A3

The emission measurements from A3 relate to FD operations only. However, these are within both the original boiler and TEG mode ELV's.

New CEMS

Installation of the new analyser and unit B was completed in 2024. The remaining analysers will be replaced in August. Technical Guidance Note (TGN) 20 states "if the operator replaces the CEM with a different type of CEM, then this replacement must either undergo a full QAL2, or only the functional tests supported by cross calibration using a verified and calibrated CEM. This entails using data from the verified CEM". Dow are planning on undertaking a full QAL 2 of all their new analysers. The guidance requires that new systems have at least 3 months of QAL3 data to demonstrate that the CEM is stable before the QAL2 and AST exercises. Dow are therefore waiting until the end of November/start of December to undertake the QAL 2's on all their analysers.

Outstanding Actions Form CAR NRW0043551**Action1 - Ripped Bellows**

During an onsite meeting on the 26th of August, Dow reported that the bellows within HRSG-A were recently ripped. The following action was issued, and no response provided.

During a Microsoft Teams meeting on the 10th of April 2024, Dow explained that the reason for the ripped bellows was due to inferior quality bellows being used at the time. Dow had originally ordered and used the original manufacturers parts which were too thin. They have since changed to a thicker material one on all three units. **Action complete.**

Action 2 Missing Data

Please resubmit by the 2nd of April, the Q4 monitoring returns with the following information:

Emission points A1 and A3:

- The result of the 95% of validated hourly averages within a calendar year for NOx when operating in FD mode against a permit limit of 200 mg/Nm³.
- The result of the 95% of validated hourly averages within a calendar year for NOx when operating in TEG mode against a permit limit of 125mg/Nm³.
- The result of the 95% of validated hourly averages within a calendar year for CO when operating in FD mode.
- The result of the 95% of validated hourly averages within a calendar year for CO when operating in TEG mode.
- The annual mean of validated hourly averages for NOx when operating in FD mode against a permit limit of 100 mg/Nm³.
- Split the November data up, if possible, and compare with the appropriate limits, i.e. the original boiler limits and the original turbine limits states above.

Emission point A2:

- The result of the 95% of validated hourly averages within a calendar year for NOx.
- The result of the 95% of validated hourly averages within a calendar year for CO.

Between January and part way through November 2023, the CHP feeding emission point A1 was operated in HRSG mode, Therefore, the original boiler ELV’s apply, plus an additional annual mean BREF ELV of 100 mg/Nm³ (annual mean of validated hourly averages).

- 100 mg/Nm³ annual mean of validated hourly averages
- 100 mg/Nm³ monthly mean of validated hourly averages
- 110 mg/Nm³ Daily mean of validated hourly averages
- 200 mg/Nm³ 95% of validated hourly averages within a calendar year

Between November and December, the CHP feeding emission point A1 operated in TEG mode for less than 1500hrs/yr, therefore, the original IED emission limits apply with no annual ELV applied.

- 75 mg/Nm³ monthly mean of validated hourly averages
- 82.5 mg/Nm³ Daily mean of validated hourly averages
- 125 mg/Nm³ 95% of validated hourly averages within a calendar year. (It’s 125 and not 150 due to the backsliding rule)

Dow have re-submitted the monitoring returns for Q4 2023 with a breakdown of the data to satisfy the requirements above (Action 2 of CAR Form CAR_NRW0043551). The results are tabulated below and show that there were no exceedances. The annual mean value for emission point A1 in TEG mode appears to be greater than the limit, however, as stated in CAR_NRW0043551 the plant needs to have operated in TEG mode for more than 1500 hours before this annual ELV to applies.

	A1 - FD mode		A1 - TEG mode	
	NOx	CO	NOx	CO
95th Percentile Limit	200	80	125	80
95th Percentile Value	104.40	53.47	60.96	48.26
Annual mean limit	100	30	55	30
Annual mean value	94.38	9.56	55.20	15.28

	A3 - FD mode		A3 - TEG mode	
	NOx	CO	NOx	CO
95th Percentile Limit	200	80	125	80
95th Percentile Value	71.90	23.64	68.91	20.95
Annual mean limit	100	30	55	30
Annual mean value	64.78	6.08	53.50	2.72

The emissions from emission point A2 were within the permitted ELV’s. The annual mean of validated hourly averages limit of 100mg/Nm³ does not apply for 2023 since the permit states “effective from the date approved by NRW upon completion of improvement condition IC8”. However, the 95% of validated hourly averages within a calendar year does apply and hasn’t been reported.

The emissions from emission point A3 were reported within the permitted ELV’s including the 95th percentile limit. **Action 2 complete.**

Action 3: where we find non-compliance, we must investigate root cause. Please explain why the results for each of the 95% of validated hourly averages within a calendar year and the annual mean values were not

reported? **Due 2nd of April.**

Dow explained that it was a simple case of them being missed from the reporting form and that Envirosoft have since updated these forms to include such data. Dow's management system should contain procedures or checks to ensure that they report all the information required by the permit. Operators should manage and operate their activities using sufficient competent persons and resources (permit condition 1.1.1.(b)). In this instance the software package failed to supply all the required information and the operator failed to notify it was missing. Therefore, **a category 3 noncompliance against permit condition 1.1.1.(b) is being issued.**

Energy Efficiency

Dow have a permit condition (1.2) requiring them to take appropriate measures to ensure that energy is used efficiently within their activities. This condition also requires Dow to review and record at least every four years whether there are suitable opportunities to improve the energy efficiency of the activities and to take any further appropriate measures identified by this review. The information required under this permit condition is considered by Dow to be proprietary information and there has been a long-standing confidential agreement between Dow and NRW that this information is kept off the public register. However, there is still a requirement for Dow to satisfy permit condition 1.2 in its entirety. Consequently, the information required to satisfy this condition was presented on the 21st of May 2024.

Dow's normal operation is to operate both Gas Turbines at maximum load with the turbines exhausting to the Heat Recovery Steam Generators (HRSG's) and with the high pressure fired boiler operating at minimum load. Additional heat demand for the chemical processes is usually met through supplementary firing of the HRSG's which is the most efficient way to generate the additional heat requirements for the site and is the most effective combustion optimisation Dow can employ. However, recently the CHP plant has had numerous issues mostly related to the installation and operation of the dry low NOx burners within the GT's. This has impacted the efficiency of the plant since the GT's have been offline and only the HRSG's have been operational. However, Dow have reiterated that it is in their best interest to operate the GT's for efficiency and financial reasons. In addition to the above, Dow also utilise an advanced control system for operation and control of the HRSG's which enables the combustion efficiency to be optimised. The HRSG's are also furnished with economizers which provide feed water preheating using recovered heat from the flue-gases before the flue-gases exit via the boiler stacks. Heat losses from the plant are also minimised through insulating radiating sources where it is economic to do so.

As it stands Dow appear to be fully aware of their energy use and track energy efficiency within their live data recording PI system. Energy efficiency is calculated using both the total system efficiency method and the effective electric efficiency method. Dow have dedicated personnel employed to manage energy efficiency across the site and across the wider company. Although Dow Silicones and Dow CHP have separate permits their integration means when reviewing and discussing energy efficiency it is easier to discuss both sites as one. Therefore, information relating to energy efficiency can also be seen in CAR_NRW0044531 (Dow Silicones, BR9685IX). NRW consider permit condition 1.2 as being complied with.

Efficient use of Raw Materials

Much like their energy efficiency permit condition, Dow have a confidential agreement with NRW with regards to relating their raw material usage to the tonnage of finished products. However, this was shared in person through a series of presentations on the 21st of May at the Dow Silicones offices. Instead of a 4-year review Dow maintain an ongoing live analysis of their raw material usage. With regards to raw material usage for the CHP the two main resources are natural gas and water. When the GT's and HRSG are operating as one-unit,

natural gas use is very efficient since both steam and electricity are being produced. Dow strive to operate in this mode as much as possible but have been hit with numerous GT operational issues over the past two years. With regards to efficient water use, Dow utilise a lot of water to ensure the Silicones site is supplied with enough steam to maintain operations. Due to a slowdown in production, because of market conditions, Dow have vented more steam to atmosphere than usual. Dow explained that this doesn't represent a very efficient picture, however, they are unable to reduce the production of steam any further and so are left with no alternative but to vent the surplus. However, Dow are looking into ways of improving this situation. It should be noted that Dow do have various heat exchangers onsite that capture the heat and produce steam from some of their exothermic reactions and don't just rely on the CHP for 100% of their steam. Dow demonstrated good awareness of the raw material usage for their CHP site and explained that fluctuations are discussed during their routine PACE meetings. NRW consider permit condition 1.3 as being complied with.

Avoidance, Recovery and Disposal of Wastes Produced by The Activities

The main waste produced by the CHP plant is water from the condensing of steam. To reduce water usage and the volume of contaminated wastewater discharged from the plant, collected condensate is recycled (where practical) to the boiler feed water tank for re-use in the steam system. Boiler blowdown is also generally minimised across the plant and only adjusted as required to control the quality of the steam/boiler feed water in the steam drums to ensure the integrity/reliability of the steam generation and distribution system. NRW consider permit condition 1.4 as being complied with.

End.

If you have any queries about this report, or to discuss completion of any actions, please contact the NRW Officer named above.

Important information

Legal status of this report

Your permit is issued to you under the Environmental Permitting Regulations. You have a responsibility to comply with the conditions of your permit and prevent pollution/harm of the environment. You must also ensure that you comply with any other relevant legislation that may apply to your site's operations.

This report explains the findings of our assessment and any action you are required to take. We categorise non-compliance using our guidance for assessing non-compliance at regulated sites.

When we find potential non-compliance/s we will normally give you advice on how to maintain compliance.

To correct non-compliance, we may:

- require you to take specific actions
- issue a notice
- review the conditions of your permit.

Any advice and guidance we give will be without prejudice to any other enforcement response that we consider may be required.

Assessment results and non-compliance categories (used in section 1):

Assessment result	Description
Assessed (A)	Assessed or assessed in part, no evidence of non-compliance found
Action only (X)	Action only relating to the activity assessment
Ongoing (O)	Ongoing non-compliance, not scored

Non-compliance category	Description	Score
C1 Major	Potential to have a major, serious, persistent and/or extensive impact or effect on the environment, people and/or property	60
C2 Significant	Potential to have a significant impact or effect on the environment, people and/or property	31
C3 Minor	Potential to have a minor or minimal impact or effect on the environment, people and/or property	4
C4 No environmental impact	Non-compliance at a regulated site that cannot foreseeably have any impact on the environment, people and/or property	0.1

How we use assessment scores

The number and severity of non-compliances recorded in a year will affect your annual subsistence fee the following year. A non-compliance factor is added to your site's Operator

Performance Risk Appraisal (OPRA) score when we calculate your fee to reflect the additional resource we use to assess permit compliance.

If your assessment result in Section 1 is suspended, what does this mean?

In line with our guidance, we may suspend scores for up to six months to allow time for remedial action to be taken. Suspended scores will be re-instated if the action is not completed.

Full list of Industry compliance criteria (used in section 1 and 2):

1. Management

- IR1A – General management
- IR1B – Finance (only applicable to Landfill)
- IR1C – Energy efficiency
- IR1D - Efficient use of raw materials
- IR1E - Avoidance, recovery and disposal of wastes produced by the activities
- IR1F - Multiple operator installations

2. Operations

- IR2A – Permitted activities
- IR2B – The site
- IR2C – Operating techniques
- IR2D – Technical requirements
- IR2E – Improvement programme
- IR2F – Pre-operational conditions
- IR2G – Landfill engineering (only applicable to Landfill)
- IR2H – Waste acceptance (only applicable to Landfill)
- IR2I – Leachate levels (only applicable to Landfill)
- IR2J – Closure and aftercare (only applicable to Landfill)
- IR2K – Landfill gas management (only applicable to Landfill)

3. Emission and Monitoring

- IR3A – Emissions to water, air or land
- IR3B – Emissions of substances not controlled by emission limits
- IR3C – Odour
- IR3D – Noise and vibration
- IR3E – Monitoring
- IR3F – Pests
- IR3G – Air quality management plans
- IR3H – Monitoring for the purposes of the Industrial Emissions Directive (this heading includes Large Combustion Plants)
- IR3I – Fire

4. Information

- IR4A – Records
- IR4B – Reporting
- IR4C – Notification

Enforcement response

Any non-compliance with a permit condition is an offence and we may take legal action against you. Action we take can include prosecution, serving a notice on you and/or

suspension or revocation of your permit. See our Enforcement and Sanctions Guidance for further information.

Data protection notice

You should make sure that anyone named in this report knows that the information it contains will be processed by Natural Resources Wales to fulfil its regulatory and monitoring functions and to maintain the relevant public register(s).

We may also use and/or disclose the report in connection with:

- offering or providing you with our literature or services relating to environmental matters
- consulting with the public, public bodies and other organisations (e.g. Health and Safety Executive, local authorities) on environmental issues
- carrying out statistical analysis, research and development on environmental issues
- providing public register information to enquirers
- investigating possible breaches of environmental law
- assessing customer service satisfaction and improving our service
- Freedom of Information Act or Environmental Information Regulations requests.

We may also pass it on to our agents or representatives to do these things on our behalf.

Disclosure of information – this report will be available to view on-line

If you think this report contains commercially confidential information that should not be placed on our public register, you must contact your local Natural Resources Wales office within **fifteen working days** of receiving this report, using the contact details in the accompanying email or letter. You must give a full explanation of why it should not be added to our public register, including specifying which information is commercially confidential. We will assess your request and respond to you within twenty working days to let you know if we agree to your request.

What do I do if I disagree with the report or have a complaint?

If you disagree with this compliance assessment report, you should contact the lead officer without delay to discuss your concerns.

If you are unable to resolve the issue with the lead officer or their line manager you should contact our Customer Contact team on 0300 065 3000 (Monday to Friday 08:00 to 18:00), or email enquiries@naturalresourceswales.gov.uk for details of how to raise your dispute further through our Complaints and Commendations procedure.

If you are dissatisfied with our response, you can contact the Public Services Ombudsman for Wales by phone on 0300 7900203 or by email at ask@ombudsman.wales

Welsh Language Standards

We are committed to establishing Natural Resources Wales as a naturally bilingual organisation. We will provide compliance reports in your preferred language.